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DOCUMENT CONTROL ADMINISTRATOR

OPERATOR'S MANUAL

WARNING

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VOLT-OHM-MILLIAMMETER

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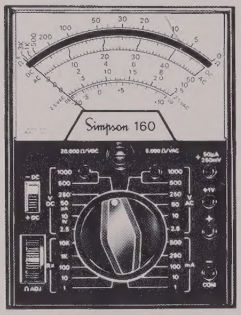

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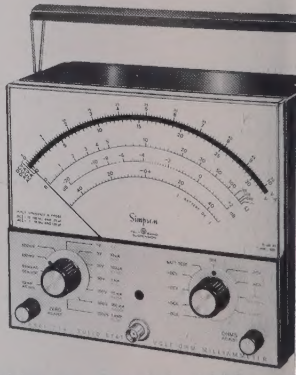

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OPERATOR'S MANUAL

SIMPSON 260®-6XL VOLT-OHM-MILLIAMMETER

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In Canada, Bach-Simpson, Ltd., London, Ontario

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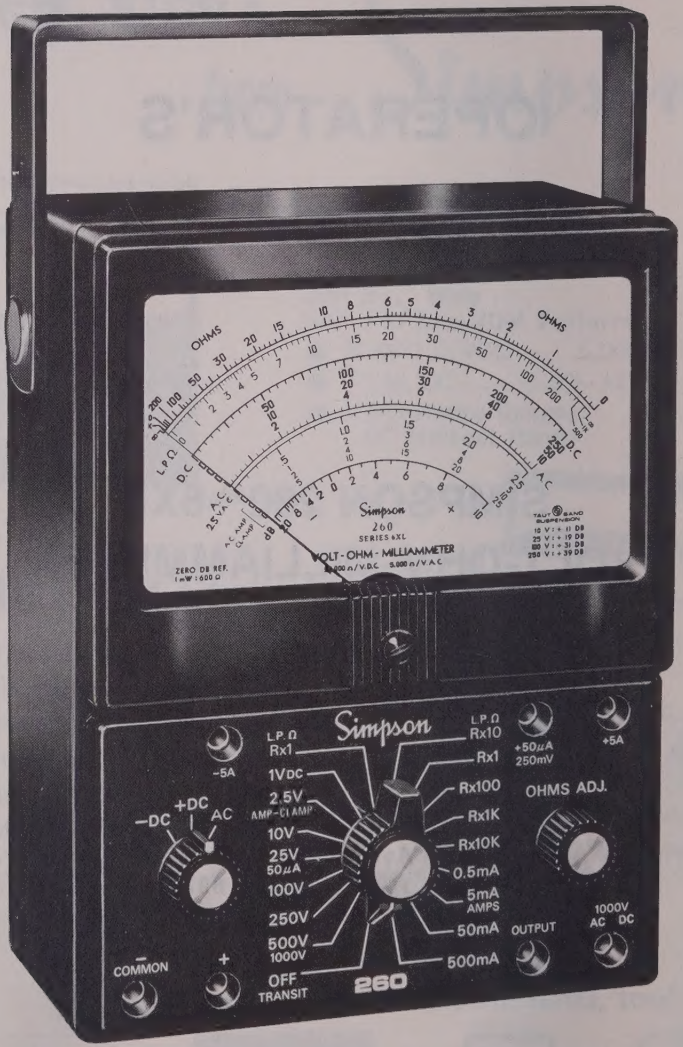

Figure 1-1. Simpson 260 Series 6XL Volt-Ohm-Milliammeter

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WARNING

The Simpson 260-6XL is designed to prevent accidental shock to the operator when properly used. No engineering design can render safe an instrument which is used carelessly. This manual must be read carefully and completely before making any measurements. Failure to follow directions can result in a serious or fatal accident.

SHOCK HAZARD (As defined in Underwriters Laboratories Radio and Television Receiving Appliances Standards for Safety, Twelfth Edition, dated June 25, 1969). "Shock hazard shall be considered to exist at any part involving a potential of between 42.4 volts peak and 40 kilovolts peak in the following cases:

A. If the current through a load of not less than 500 ohms exceeds 300 milliamperes after 0.0003 second.

B. If the current through a load of not less than 500 ohms exceeds 5 milliamperes after 0.2 second.

C. If the time required for the current through a load of not less than 500 ohms to decrease to 5 milliamperes is between 0.1 and 0.2 second, and the total quantity of electricity passed through the load up to that time exceeds 4 millicoulombs.

D. If the time required for the current through a load of not less than 500 ohms to decrease to 5 milliamperes is between 0.03 and 0.1 second, and the total quantity of electricity passed through the load up to that time exceeds $75T\text{-}350T^2$ millicoulombs, where T is the time in seconds.

E. If the potential is more than 5 kilovolts peak and if the total capacitance of the circuit is more than 3000 microfarads".

NOTE: Additional factors might apply when potentials more than 40 kilovolts peak are present.

SECTION I

INTRODUCTION

1.1 GENERAL

1.1.1 The Simpson 260-6XL is a rugged, high-performance, battery-operated Volt-Ohm-Milliammeter capable of making a wide variety of electrical measurements simply and accurately. It features low power ohms and a wide range coverage. The case is made from high-impact ABS plastic and is contemporarily styled. These features, in combination with the extended range coverage (see Table 1-1), make the 260-6XL a general-purpose, portable or laboratory Instrument. It is well suited to servicing, production, inspection and engineering applications.

1.1.2 The 260-6XL utilizes the Simpson taut-band movement. The movement provides self-shielding. The taut-band suspension provides a high degree of repeatability and is also highly resistant to shock or vibration.

1.2 UNPACKING AND INSPECTION

Prior to unpacking, examine the shipping carton for any sign of damage. If there is none, inspect the Instrument and packing material for obvious damage from mechanical shock, water leakage, or other causes. Check the electrical performance as soon as possible. If there is any indication of damage, file a complaint with the carrier immediately. Also check that all accessories are included (Table 5-1). Save the shipping carton and packing materials for future storing or shipping of the Instrument.

1.3 ACCESSORIES AND SUPPLIES

All supplies and accessories required for the operation of the Instrument are furnished with the Instrument and are listed in Table 5-1. Other accessories are listed in Table 5-2.

1.4 TECHNICAL DATA

Table 1-1 lists the technical specifications for the Simpson 260-6XL Volt-Ohm-Milliammeter.

NOTE: Accuracy specifications apply to measurements made with the Instrument in a horizontal position.

Reference Conditions: +25°C ±5°C; 45% to 75% relative humidity.

Table 1-1. Technical Data

1.	**DC Voltage**	
	Ranges (full scale):	250 mV, 1.0V, 2.5V, 10V, 25V, 100V, 250V, 500V, 1000V
	Accuracy:	±2% of full scale on all ranges
	Sensitivity:	20,000 ohms/volt
2.	**AC Voltage**	
	Ranges (full scale):	2.5V, 10V, 25V, 100V, 250V, 500V and 1000V
	Accuracy:	±3% of full scale on all ranges
	Sensitivity:	5000 ohms/volt
	Frequency Response:	See curves on page 3-6 (Fig. 3-1)
3.	**Ohms**	
	Conventional Ohms:	
	Ranges:	RX1, RX100, RX1K and RX10K
	Ohms Center:	6, 600, 6000 and 60K
	Maximum Scale Reading:	1000 ohms (RX1)
	Accuracy:	±2.5° of arc on the RX1 range; ±2.0° of arc on all other ranges
		The nominal open-circuit voltage for all ranges up to and including RX1K is 1.5V.

The RX10K range has an open circuit voltage of 9V.

The maximum current drawn from the 1.5V battery is 250 mA (RX1 with test leads shorted).

Low Power Ohms:

Ranges:	RX1 and RX10
Ohms Center:	20 and 200 ohms
Maximum Scale Reading:	1000 ohms (RX1)
Accuracy:	±2.5° of arc

The maximum open-circuit voltage for the low power ohms range is 100 mV and the maximum measuring power is 0.125 mW. The battery quiescent current is 4.3 mA at RX1 and 0.43 mA at RX10.

4. DC Current:

Range (full scale)	Voltage Drop	Accuracy	Internal Resistance
0-50 μA	250 mV	±1.5% of F.S.	5000 Ω
0-0.5 mA	250 mV	±2.0% of F.S.	500 Ω
0-5 mA	252 mV	±2.0% of F.S.	50.4 Ω
0-50 mA	252 mV	±2.0% of F.S.	5.04 Ω
0-500 mA	400 mV	±2.0% of F.S.	.8 Ω
0-5A	250 mV	±2.0% of F.S.	.05 Ω

5. OUTPUT Jack:

A. Voltage (AC)	2.5V, 10V, 25V, 100V, 250V
Frequency Response:	See curves on page 3-9 (Fig. 3-2)

B. Decibels (dB) Ref: 1 mW into 600 Ω = 0 dB

Range (AC)	Range dB
2.5V	Read Direct
10V	Add 11 dB to reading
25V	Add 19 dB to reading
100V	Add 31 dB to reading
250V	Add 39 dB to reading

Accuracy: ±1 dB at the zero dB point

6. **The rated circuit to ground voltage*: (Often called "float potential")**

1000 VDC or 1400 V peak

7. **Readout:** 4-1/2 inch, 50 μA (full scale) taut-band meter

8. **Overload Capability:**

Voltage: Voltage ranges up to and including 100 volts AC and DC will withstand momentary overloads of 2 times full scale. The 500 volts AC and DC ranges will withstand momentary overloads of 2.5 times full scale.

Current: Current ranges will withstand momentary overloads of 5 times full scale. A 1 ampere 250V quick-action fuse protects all resistance and current ranges (except the 5A current range).

9. **Power Requirements:** Two batteries. (Refer to paragraph 4.4.2 for installation and battery replacement). One 1.5V cell, NEDA 13F. One 9V cell, NEDA 1604.

10. **Dimensions:** 5-¼" wide x 7" long x 3-⅛" deep (133 x 178 x 79 mm)

11. **Weight:** 2-½ pounds (1.14 kg)

12. **Fuse:** 1 Ampere, 250 Volts, type 3AG

*Per ANSI C39.5 April 1974.

SECTION II

DESCRIPTION

2.1 FRONT PANEL

The 260-6XL Volt-Ohm-Milliammeter has a large, easy-to-read 4-1/2″ indicating Instrument. Below the indicating instrument are three controls and seven circuit jacks. Switch positions and circuit jacks are marked in white, blue, green and red characters which are printed on a vinyl panel overlay. The colors on the overlay correspond to the dial graphics.

2.1.1 RANGE SWITCH

The range switch has 18 positions. It may be turned to any position in either direction. There are seven voltage positions, four direct current positions, six resistance positions and an OFF/TRANSIT position. Two of the resistance positions are for "Low Power Ohms".

2.1.2 FUNCTION SWITCH

The function switch has three positions: −DC, +DC and AC. To measure DC current or voltage, set the function switch at −DC or +DC, depending on the polarity of the signal applied across the test leads. For resistance measurements, the switch may be in either the +DC or −DC position. The function switch can reverse the test leads without need for removing the test leads from the circuit under test. To measure AC voltage, set the function switch in the AC position.

2.1.3 OHMS ADJUST

The ohms adjust control is a variable resistor in the ohmmeter circuit which makes it possible to adjust the indicating instrument to infinity (∞) prior to resistance measurements on low ohms, or to zero on the conventional ohms ranges.

Figure 2-1. Simpson 260-6XL, Front Panel

2.1.4 CIRCUIT JACKS

There are seven jacks on the front panel. They are the connections for the test leads. The elbow prods of the test leads are plugged into the proper jacks for the circuit and range desired for each application. At the lower left are −COMMON and + jacks. The black test lead is connected to −COMMON for all circuits and ranges except 5 amperes DC. The red test lead is connected to the + jack for all circuits and ranges except those designated by the other jacks.

Across the top of the panel are jacks marked −5A, dual marking of +50 μA and 250 mV at a single jack, and +5A. For the 50 microampere or 250 millivolt DC range, the red test lead is connected to this dual marked jack. For the 5 ampere DC range, the black test lead and the red test lead are connected to the −5A and +5A jacks, respectively.

At the lower right are the OUTPUT and 1000V jacks. For all OUTPUT ranges, and for 1000 volts AC or DC, the red test lead is connected to the appropriate jack with the black lead in the −COMMON jack.

2.2 TEST LEADS

Each Instrument is furnished with one pair of test leads 4 feet long. For polarity identification, one lead is black and the other red. The test lead wire consists of a large number of fine strands to insure flexibility.

2.2.1 The insulation of the wire is high-grade rubber and is more than adequate for the highest voltage the Instrument is intended to measure. The red and black test leads have probe tips which are threaded near the base. The alligator clips may be screwed on or off either test lead to provide a probe or a clip for the operator's convenience.

2.3 TEST LEAD INSPECTION

Inspect the test leads periodically to detect cuts, burned areas or other damage that could reduce the insulation strength of the leads. When defects are noted, order replacement leads (Simpson catalog number 00115) from your local parts distributor.

2.4 FUSE PROTECTION

A 1 ampere 250V fuse is provided to protect the 260 circuits from misuse on the ohmmeter ranges and from excessive overloads on the milliampere ranges. If the Instrument fails to indicate, the fuse might be burned out. See Section IV for fuse replacement. A spare fuse is furnished with the 260. Both fuses are located in the battery and fuse compartment.

2.5 MOVEMENT OVERLOAD PROTECTION

In addition to the fuse, a varistor protects the indicating instrument circuit. In the event of overload, the varistor limits the current through the moving coil. The fuse and varistor will prevent serious damage to the 260 in most cases of accidental overload. However, no overload protection system is completely foolproof and misapplication, when working with high voltage circuits, can damage the Instrument. Always exercise care and caution to protect both yourself and the Instrument.

2.6 INTERNAL BATTERIES

There are two batteries in the ohmmeter circuits. One is a NEDA 13F D size cell that furnishes 1.5 volts for all the resistance ranges up to RX1K. A NEDA 1604 battery furnishes 9 volts for the RX10K range. The 1.5 volt D cell is held in place with two spring clips which also serve as battery contacts. Be sure to observe correct polarity when replacing the 1.5 volt D cell. The 9 volt battery is held in place with a spring clip but contact is made with a separate connector that is polarized.

SECTION III

OPERATING INSTRUCTIONS

WARNING

The Simpson 260-6XL is designed to prevent accidental shock to the operator when properly used. No engineering design can render safe an Instrument which is used carelessly. This manual must be read carefully and completely prior to making any measurements. Failure to follow directions can result in a serious or fatal accident.

3.1 GENERAL

This section of the manual contains all the information related to operation of the Instrument. Special notes and instructions also have been included for added safety and convenience.

3.2 SAFETY PRECAUTIONS

3.2.1 The 260-6XL Volt-Ohm-Milliammeter is intended for use only by personnel qualified to recognize shock hazards and trained in the safety precautions required to avoid possible injury. Refer to the "SHOCK HAZARD" definition on page v.

3.2.2 Do not work alone when making measurements of circuits where a shock hazard might exist. Notify another person that you are making, or intend to make, such measurements.

3.2.3 Locate all voltage sources and accessible current paths prior to making measurement connections. Be sure the equipment is grounded properly and that the right rating and type of equipment fuse(s) is installed. Set the Instrument to the proper range before applying power.

3.2.4 Voltages might appear unexpectedly in defective equipment. An open bleeder resistor can result in a capacitor retaining a dangerous charge. Turn the power off and discharge all capacitors before connecting or disconnecting the test leads.

3.2.5 For your own safety, inspect the test leads for cracks, breaks or crazes in the insulation, prods and connectors before each use. If any defects are noted, replace the test leads immediately.

3.2.6 Do not make measurements near a circuit where corona is present. Corona can be identified by a pale blue color emanating from sharp metal points in the circuit, or by a buzzing sound, or by the odor of ozone. In rare instances, such as around germicidal lamps, ozone might be generated as a normal function. Ordinarily, the presence of ozone indicates presence of high voltage and probably an electrical malfunction.

3.2.7 Hands, shoes, floor and workbench must be dry. Avoid making measurements under humid, damp, or other environmental conditions that could affect the dielectric withstanding voltage of the test leads or the Instrument.

3.2.8 For maximum safety, do not touch the Instrument leads while power is applied to the circuit being measured. Always inspect leads and connectors for cracks, breaks or crazes before each use. If any defects are noted, replace the defective item immediately.

3.2.9 Use extreme caution when making measurements in an rf circuit where a dangerous combination of voltages could be present, such as in a modulated rf amplifier.

3.2.10 Do not make measurements using test leads of lesser safety than those originally furnished with the Instrument.

3.2.11 Do not touch any object which could provide a current path to the common side of the circuit under test or power line ground. Always stand on a dry insulated surface capable of withstanding the voltage being measured.

3.3 UNPACKING

After unpacking the 260, you will find a 1.5V and 9V battery in separate envelopes in the box with the Instrument and test leads. Two alligator clips for the test leads are in a polyethylene bag. See Section IV for instructions on how to open the battery compartment and install the batteries.

3.4 ADJUST POINTER FOR ZERO

With the volt-ohm-milliammeter in operating position, check that the pointer indicates zero at the left end of the scale when there is no input to the 260. If pointer is off zero, adjust the screw located in the case below center of the dial. Use a small screwdriver to turn the screw slowly clockwise or counterclockwise until the pointer is exactly over the zero mark at the left end of the scale. With the indicating pointer set on the zero mark, reverse the direction of rotation of the zero adjuster. Rotate the zero adjuster a sufficient amount to introduce mechanical freedom or "play" but insufficient to disturb the position of the indicating pointer. This procedure will avoid disturbances to the zero setting from subsequent changes in temperature, humidity, vibration and other environmental conditions.

3.5 POLARITY CORRECTION

When making DC measurements with the test leads connected to the + and COMMON jacks, polarity can be reversed with the function switch without reversing the test leads. When making measurements on the 50 μA/250 mV range, or 5A range, polarity can be corrected only by reversing the test leads.

NOTE: Change the range switch or function switch positions only when the power to the circuit being measured is turned off or when the test leads are disconnected. In addition to safety, this practice will eliminate arcing at the switch contacts and prolong the life of the Instrument.

3.6 DC VOLTAGE MEASUREMENT

WARNING

Prior to making voltage measurements, review the SAFETY PRECAUTIONS listed in paragraph 3.2.

3.6.1 0-250 Millivolts

CAUTION

When using the 260 as a millivoltmeter, care must be taken to prevent damage to the indicating instrument from excessive voltage. Before using the 250 millivolt range, first use the 1.0 volt DC range to affirm that the voltage measured is no greater than 250 millivolts.

a. Set the function switch at +DC.

b. Plug the black test lead into the −COMMON jack and the red test lead into the +50 μA/250 mV jack.

c. Set the range switch at the 25V (50μA) position.

d. Connect the black test lead to the negative side of the circuit being measured and the red test lead to the positive side of the circuit.

e. Turn power on and read the voltage on the black scale marked DC and use the figures marked 0-250. Read directly in millivolts.

f. Turn power off, disconnect test leads and return the range switch to the OFF/TRANSIT position.

3.6.2 Measuring DC Voltage: 0-1 through 0-500 volts

a. Set the function switch to +DC.

b. Plug the black test lead into the −COMMON jack and the red test lead into the + jack.

c. Set the range switch at one of the seven voltage range positions marked 1V, 2.5V, 10V, 25V, 100V, 250V or 500V. When in doubt about the approximate voltage present, always use the highest voltage range as a protection to the Instrument. If the voltage reading is within a lower range, the switch then may be set to a lower range to obtain a more accurate reading.

d. Be sure the power is off in the circuit being measured and all capacitors have been discharged.

e. Connect the black test lead to the negative side of the circuit being measured and the red test lead to the positive side of the circuit.

f. Turn on the power to the circuit and read the voltage on the black scale marked DC. For the 2.5V and 25V ranges, use the 0-250 figures and divide by 100 and 10, respectively. For the 10V, and 250V ranges, read the figures directly. For the 500V range, use the 0-50V figures and multiply by 10. For the 100V range, use the 0-10V figures and multiply by 10. For the 1V range, use 0-10 figures and divide by 10.

g. Turn power off, disconnect test leads and return the range switch to the OFF/TRANSIT position.

3.6.3 Measuring DC voltage: 0-1000 volts

WARNING

Be extremely careful when working with high voltage circuits. Do not touch the Instrument or test leads while power is on in the circuit being measured.

a. Set the function switch at +DC.

b. Set the range switch at 1000V (dual position with 500V).

c. Plug the black test lead into the −COMMON jack and the red test lead into the 1000V jack.

d. Be sure the power is off in the circuit being measured and that all capacitors have been discharged. Connect the black lead to the negative side and the red lead to the positive side of the circuit.

e. Turn on power in the circuit being measured.

f. Read the voltage on the black scale marked DC, using the 0-10 figures. Multiply the reading by 100.

g. Turn the power off, disconnect the test leads and return the range switch to the OFF/TRANSIT position.

NOTE: To measure higher DC voltages, refer to Table 5-2 for high-voltage accessory probes.

3.7 AC VOLTAGE MEASUREMENTS

WARNING

Before making voltage measurements, review the SAFETY PRECAUTIONS listed in paragraph 3.2.

3.7.1 Measuring AC voltage

NOTE: The Simpson 260 responds to the full-wave average value of an AC waveform. It is calibrated in terms of the RMS value of a pure sine wave. If the waveform is nonsinusoidal, the reading might be either higher or lower than the true RMS value, and could result in a substantial error. Also, accuracy is lessened at higher input frequencies (see Figure 3-1).

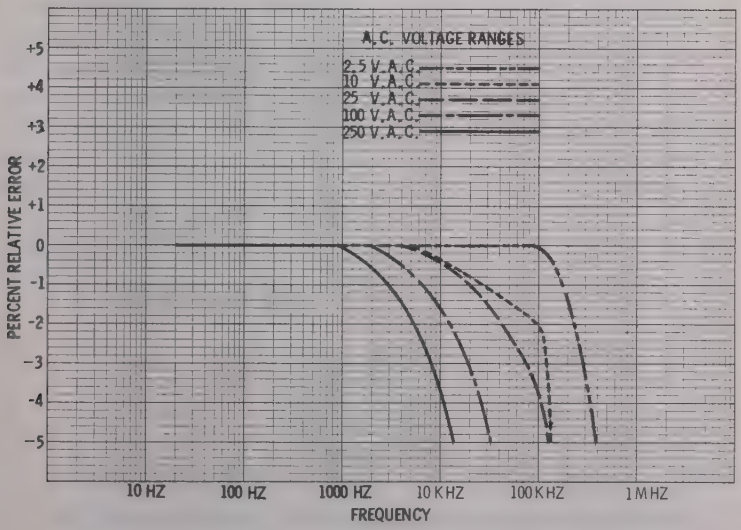


Figure 3-1. Typical Frequency Response AC Voltage Ranges

a. Set the function switch at AC.

b. Set the range switch at one of the six voltage range positions marked 2.5V, 10V, 25V, 100V, 250V, or 500V. When in doubt about the actual voltage, always use the highest voltage range as a protection to the Instrument. If the voltage is within a lower range, the switch may be set at a lower range to obtain a more accurate reading.

c. Plug the black test lead into the −COMMON jack and the red test lead into the + jack.

d. Connect the test leads across the voltage source.

e. Turn on the power in the circuit being measured.

f. For the 0-2.5V range, read the value directly on the red scale marked 2.5V.A.C. For the 10V, 25V, 100V, 250V and 500V ranges, read the red scale marked AC and use the black figures immediately above the scale. For the 10V and 250V range, read directly using the 0-10 and 0-250 figures respectively. For the 500V range, read directly on the 0-50 figures and multiply the reading by 10. For the 100V range, read directly the 0-10 figures and multiply the reading by 10. For the 25V range, use the 0-250 figures and divide by 10.

g. Turn power off, disconnect the test leads and return the range switch to the OFF/TRANSIT position.

3.7.2 Measuring AC Voltage: 0-1000 volts

WARNING

For maximum safety, avoid touching the Instrument or the test leads while the power is on in the circuit being measured.

a. Set the function switch at AC.

b. Set the range switch at 1000V (dual position with 500V).

c. Plug the black test lead into the −COMMON jack and the red test lead into the 1000V jack.

d. Be sure the power is off in the circuit being measured and that all its capacitors have been discharged. Connect the test leads across the voltage source, with the black lead on the ground side.

e. Turn on the power in the circuit being measured.

f. Read the voltage on the red scale marked AC. Use the 0-10 figures and multiply by 100.

g. Turn power off, disconnect the test leads and return the range switch to the OFF/TRANSIT position.

3.8 MEASURING OUTPUT VOLTAGE

Often it is necessary to measure the AC component of a voltage consisting of a mixture of both AC and DC voltages, as in amplifier circuits. The 260 has a 0.1 μF, 400 volt capacitor in series with the OUTPUT jack. The capacitor blocks the DC component of the voltage in the test circuit, but passes the AC component. The blocking capacitor alters the AC response of the Volt-Ohm-Milliammeter at low frequencies. See Figure 3-2 for frequency response (AC voltage ranges).

WARNING

When making OUTPUT measurements, do not connect the 260 to a circuit whose DC voltage component exceeds the 400 volt rating of the blocking capacitor.

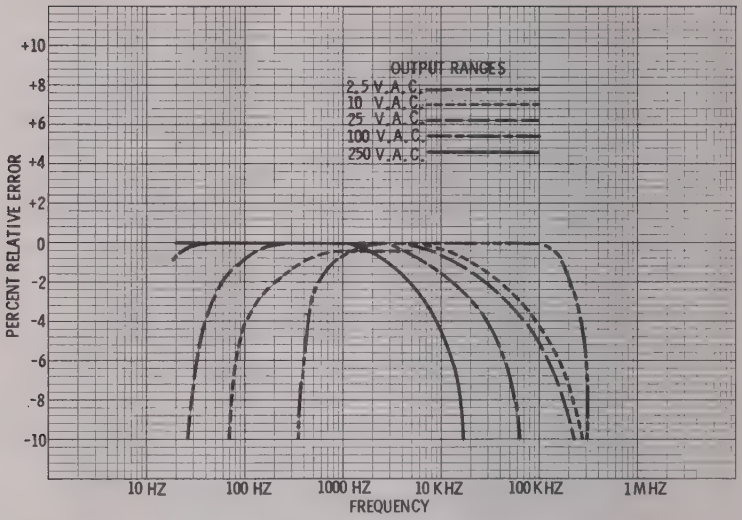


Figure 3-2. Typical Frequency Response Output Ranges

a. Set the function switch at AC.

b. Plug the black test lead into the −COMMON jack and the red test lead into the OUTPUT jack.

c. Set the range switch at one of the range positions marked 2.5V, 10V, 25V, 100V or 250V.

d. Connect the test leads across the circuit being measured with the black test lead to the ground side.

e. Turn on the power in the test circuit. Read the output voltage on the appropriate AC voltage scale. For the 0-2.5V range, read the value directly on the red scale marked 2.5V.A.C. For the 10V, 25V, 100V or 250V ranges, use the red scale marked AC and read the black figures immediately above the scale.

3.9 MEASURING DECIBELS

For some applications, voltages frequently are measured in terms of decibels. The decibel (dB) scale at the bottom of the dial is marked from −20 to +10. To measure decibels, read the dB scale by following the instructions for measuring AC. When the range switch is set on the 2.5V position, read the dB scale directly.

3.9.1 The dB readings on the scale are referenced to zero dB power level of .001 watt into 600 ohms, or 0.775 VAC across 600 ohms. For the 10V range, read the dB scale and add +11 dB to the reading. For corresponding deflections on the 25V range, read the dB scale and add +19 dB to the reading. On the 100V range, add +31 dB to the reading. On the 250V range add +39 dB to the reading.

3.10 DIRECT CURRENT MEASUREMENTS

WARNING

Prior to making current measurements, review the SAFETY PRECAUTIONS listed in paragraph 3.2.

NOTE: The voltage drop across the 260 on all milliampere current ranges is approximately 250 millivolts measured at the jacks. An exception is the 0-500 mA range, where the drop is approximately 400 millivolts. The voltage drop will not affect most circuits whose current is being measured. In some transistor circuits, it might be necessary to take the voltage drop into account when making voltage measurements.

3.10.1 Measuring Direct Current: 0-50 microamperes

CAUTION

When measuring current in high voltage circuits, always connect the Instrument in series with the ground side of the circuit. Never exceed the rated circuit to ground voltage (see page 1-4, item 6).

a. Set the function switch at +DC.

b. Plug the black test lead into the −COMMON jack and the red test lead into the +50 μA/250 mV jack.

c. Set the range switch at the 25V (50μA) position.

d. Open the circuit in which the current is being measured. Connect the Instrument in series with the circuit. Connect the red test lead at the positive side and the black test lead at the negative side.

e. Turn the power on and read the current on the black DC scale. Use the 0-50 figures to read directly in microamperes.

f. Turn the power off, disconnect test leads and return the range switch to the OFF/TRANSIT position.

NOTE: In all direct current measurements, be certain the power to the circuit being tested has been turned off before disconnecting test leads and restoring circuit continuity.

3.10.2 Measuring Direct Current: 0-0.5 through 0-500 milliamperes

a. Set the function switch at +DC.

b. Plug the black test lead into the −COMMON jack and the red test lead into the + jack.

c. Set the range switch at one of the four range positions marked .5 mA, 5 mA, 50 mA or 500 mA.

d. Turn the power off and open the circuit in which the current is being measured. Connect the Instrument in series with the circuit being tested. Connect the red test lead to the positive side and the black test lead to the negative side.

e. Turn on the power to the circuit under test.

f. Read the current in milliamperes on the black DC scale marked 0-50. For the .5 mA and 5 mA ranges, the reading is divided by factors of 100 and 10, respectively. The 50 mA range is read directly. The reading in the 500 mA range is multiplied by a factor of 10.

g. Turn power off, disconnect the test leads and return the range switch to the OFF/TRANSIT position.

3.10.3 Measuring Direct Current: 0-5 amperes

CAUTION

For maximum safety and for the protection of the Instrument, never remove a test lead from its panel jack while there is current in the circuit.

a. Plug the black test lead into the −5A jack and the red test lead into the +5A jack.

b. Set the range switch at 5 AMPS (dual position with 5 mA).

c. With power OFF, open the circuit in which the current is being measured. Connect the Instrument in series with the circuit. Connect the red test lead at the positive side and the black test lead at the negative side.

d. Turn on the power in the circuit under test.

NOTE: The function switch has no effect on polarity for the 5 AMPS range.

e. Read the current directly on the black DC scale. Use the 0-50 figures; divide by 10 to read amperes.

f. Turn power off, disconnect the test leads and return the range switch to the OFF/TRANSIT position.

3.11 RESISTANCE MEASUREMENTS

WARNING

Before making resistance measurements, all power to the circuit under test must be removed and all capacitors discharged.

3.11.1 The 260-6XL has six resistance ranges. Two are "Low Power Ohms" and the remaining are conventional ohm ranges, and are powered by two batteries. The "Low Power Ohms" ranges are used for accurate and safe measurement of the resistance within semiconductor circuits. The low open-circuit voltage of 100 millivolts assures that the circuit measured will not be damaged or its resistance affected by conducting diodes. Depending on the range selected, the open circuit voltage for the conventional ohms ranges is 1.5V or 9V.

3.11.2 A single OHMS ADJ. control is provided for all the resistance ranges. This control compensates for variations in battery voltage and allows the user to zero the Instrument before measuring resistance.

3.11.3 Measuring Resistance:

Using Low Power Ohms Ranges.

a. Turn the range switch to the desired resistance range marked in blue and the function switch to either the −DC or +DC position.

b. Plug the black test lead into the −COMMON jack and red test lead into the + jack.

c. With the test leads separated, rotate the OHMS ADJ. control to set the Instrument pointer at infinity (∞) on the blue LP ohm arc. If the pointer cannot be adjusted to infinity (∞), replace the 1.5V battery. See Section IV for instructions.

d. Connect the test leads to the circuit whose resistance is to be measured. Read the resistance on the blue arc and multiply it by the factor indicated on the range switch.

e. Disconnect test leads and return the range switch to the OFF/TRANSIT position.

NOTE: When not in use, never leave the range switch in the "Low Power Ohms" position because power is drawn continuously from the 1.5V battery.

3.11.4 Measuring Resistance:

Using Conventional Ohms Ranges

a. Turn the Range switch to the desired range and the Function switch to either the +DC or −DC position.

b. Plug the black test lead into the −COMMON jack and the red test lead into the + jack.

c. Connect the ends of the test leads to short the Volt-Ohm-Milliammeter resistance circuit.

d. Rotate the OHMS ADJ. control to set the Instrument pointer to zero on the black ohms scale. If full deflection cannot be obtained, replace the 1.5V battery for R×1. Replace the 9V battery if the R×10K range cannot be adjusted to full scale. For battery replacement, refer to Section IV.

e. Disconnect ends of test leads and connect to component being measured.

f. Read the resistance on the black ohms scale. Multiply the reading by the factor indicated on the range switch.

g. Disconnect test leads and return the range switch to the OFF/TRANSIT position.

3.12 AC CURRENT MEASUREMENTS USING SIMPSON AMP-CLAMP MODEL 150

(See list of accessories Section V, Table 5-2)

a. Do not touch the current-carrying conductor. Keep hand at actuating lever position of the Amp-Clamp and away from the jaw end.

b. Do not apply the Amp-Clamp to any conductor having a potential greater than 750 volts.

c. Do not apply the Amp-Clamp to any conductor carrying a current which exceeds 250 amperes.

3.12.1 The Simpson Amp-Clamp Model 150 is an accessory that permits AC current measurements without breaking the circuit under test. The Amp-Clamp works, in effect, as a transformer containing a split core that accommodates the current-carrying conductor. The current-carrying conductor becomes a transformer primary and a coil in the Amp-Clamp serves as the secondary winding. The Amp-Clamp output voltage is proportional to the current measured and is applied to the 260 as an AC voltage. The Amp-Clamp has a range selector with 6 positions. Any of the following current ranges can be used with the 260: 5, 10, 25, 50, 100 or 250 amperes.

a. Set the function switch of the 260 to AC and the range switch to 2.5V.

b. Set the current range selector on the Amp-Clamp to a range which covers the probable current being measured.

c. Connect the Amp-Clamp leads to the −COMMON and + jacks of the 260.

d. Open the jaws of the Amp-Clamp and place around the conductor whose current is to be measured.

e. Using the green AC scales, read the current on the red 2.5 VAC arc. Read the 5A, 10A and 25A ranges directly on the appropriate scale. The 50A, 100A and 250A ranges are read on the same arc; multiply the reading by 10.

SECTION IV

MAINTENANCE

4.1 GENERAL

The Simpson Model 260-6XL Volt-Ohm-Milliammeter has been designed carefully and constructed with high quality components. By providing reasonable care, and following the instructions in this manual, the user can expect a long useful service life from this Instrument.

4.2 WARRANTY

The Simpson Electric Company warranty policy is printed on the inside back cover of the manual. Read carefully prior to requesting a warranty repair.

NOTE: For assistance of any kind, including help with the Instrument under warranty, contact your nearest Authorized Service Center for instructions. These centers are listed on the last pages of this manual. If you wish to contact the factory directly, give full details of the difficulty and include the Instrument model number, serial number and date of purchase. Service data or shipping instructions will be sent to you promptly. There will be no charge for repair of the Instrument under warranty beyond one-way transportation charges. If an estimate of charges for non-warranty or other service work is required, a maximum charge estimate will be quoted. This charge will not be exceeded without your prior approval. Repair charges will be billed on the basis of cost.

4.3 SHIPPING

Pack the Instrument carefully, and ship prepaid to the destination indicated. Insure the shipment.

4.4 BATTERY AND FUSE REPLACEMENT

The batteries and fuse are located inside an isolated compartment at the top-rear of the 260-6XL case. To open the compartment, proceed as follows:

a. Place the Instrument face down on a soft padded surface.

b. Unscrew the single captivated screw on the cover.

c. Remove the cover from the case and set it aside. Batteries and fuse now can be replaced (See Fig. 4-1).

4.4.1 Battery replacement is indicated whenever the Instrument cannot be adjusted to infinity (∞) with open test leads on the Low Power Ohmmeter ranges, or with shorted test leads on the conventional ohmmeter ranges. If these adjustments cannot be made, replace the 1.5V, D size cell. If the ohms adjustment cannot be made on the RX10K range, replace the 9 volt battery.

4.4.2 The procedure for replacing batteries is as follows:

a. To remove the D size cell, grasp the battery at the center and pull directly up. To install new cell, insert the (−) side first; push against the (−) terminal spring clip, and then gently push the (+) side of the cell into place.

b. To remove the 9 volt battery, first withdraw battery, with mating connector, from the compartment.

c. Remove the connector from the old battery and connect it to new battery.

d. Put the new battery into the compartment.

e. Place the connector leads so they rest between the cavity walls and clear the fuse terminals. Place the extended leads between the battery holder and top wall of the case.

4.4.3 Fuse replacement is indicated when there is no meter deflection on any of the DC, AC VOLTS or OHMS ranges but the DC AMPS range operates properly.

4.4.4 The procedure for replacing the 1 ampere fuse is as follows:

a. Pull the defective fuse from its retaining spring clips (fuse holder).

b. Snap-in the replacement fuse and reinstall cover.

NOTE: A spare fuse is located in a cavity next to the fuse clip. Use only if proper replacement fuse is not available; i.e., save the internal spare for an emergency.

4.5 CASE REMOVAL

Whenever maintenance other than battery and fuse replacement is required, remove the Instrument from its case.

4.5.1 The procedure is as follows:

a. Place the Instrument face down on a soft padded surface.

b. Remove the Battery and Fuse compartment cover, located at the top rear of the 260-6XL case. (Refer to paragraph 4.4) Unscrew the 4 screws located at the 4 corners of the case.

c. Lift the case off the Instrument and set it aside. Maintenance now can be performed on the Instrument (see fig. 4-1).

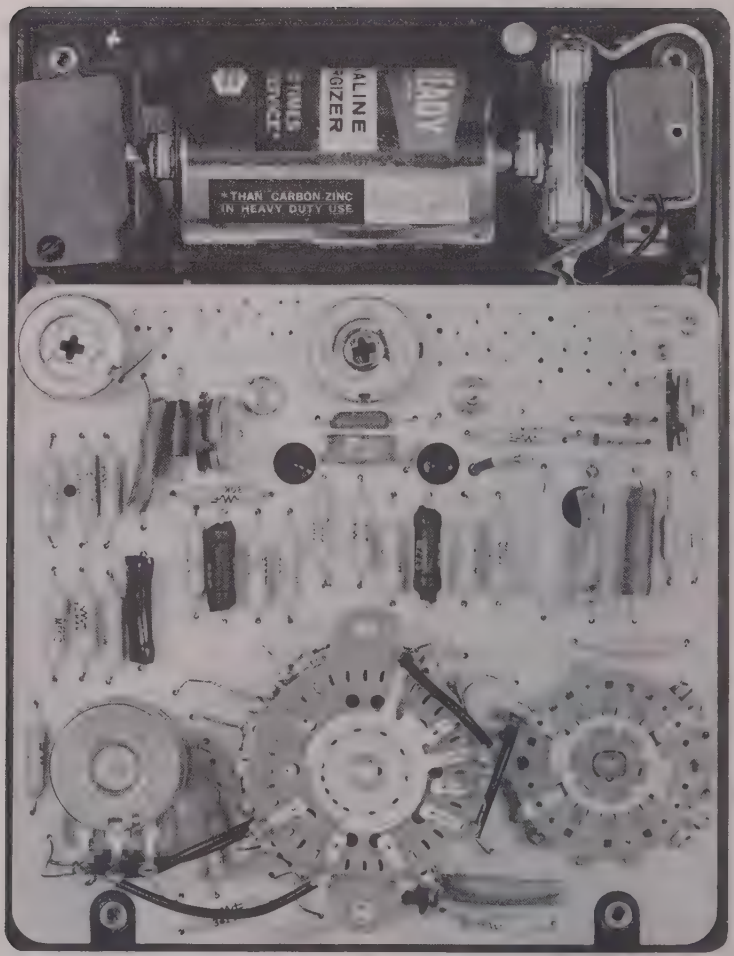


Figure 4-1. 260-6XL, Rear View With Cover Removed.

4.6 PREVENTIVE MAINTENANCE

4.6.1 Daily Care

a. Immediately clean all spilled materials from the Instrument and wipe dry. If the spillage is corrosive, use a suitable cleaner to neutralize the corrosive action, and remove the spillage.

b. Whenever the Instrument is not in use, rotate the range selector switch to the OFF/TRANSIT position.

c. Whenever possible, avoid prolonged exposure or usage in areas which are subject to temperature and humidity extremes, vibration or mechanical shock, dust or corrosive fumes, or strong electrical or electromagnetic interferences.

4.6.2 Monthly Care

Verify Instrument accuracy by performing operational checks using known accurate, stable sources. If proper calibration equipment is not available, contact your nearest Simpson Authorized Service Center. Refer to last pages of this manual. If the Instrument has not been used for 30 days, check the batteries for leakage and replace if necessary.

4.6.3 Annual Care

It is recommended that the Instrument be returned annually to your nearest Simpson Authorized Service Center, or to the factory, for an overall check, adjustment and calibration.

4.6.4 Storage

When the Instrument is not in use, store it in a room free from temperature extremes, dust, corrosive fumes, and mechanical vibration or shock. If storage time is expected to exceed 30 days, remove the batteries.

SECTION V

ORDERING INFORMATION, ACCESSORIES AND REPLACEMENT PARTS

5.1 GENERAL

This section provides a listing of the replaceable parts for this Instrument and necessary ordering information. The parts are listed by Simpson part number, description and schematic reference symbol, to facilitate the ordering of the replacement parts.

5.2 ORDERING INFORMATION

If replacement parts are needed from any Simpson Authorized Service Center (see listing on following pages) provide the following information:

a. Model and Series number of the Instrument (use 260-6XL)

b. Simpson part number and description.

5.3 CUSTOMER REPAIR SERVICE

Repairs or recalibration of Simpson Products are performed by the Customer Service Department at the factory and/or Simpson Authorized Service Centers. However, before returning your Instrument to either the Simpson Electric Company or an Authorized Service Center, contact one of those listed for shipping instructions. Provide a detailed description of the Instrument difficulty, along with Instrument model number, serial number and date of purchase.

Table 5-1. Accessories Furnished with the Instrument

Quantity	Description	Catalog Number
1	Test Lead Set — One red and one black, 4 ft. long, each with combination probe tip and removable rubber-sleeved alligator clip at one end and banana plug on opposite end.	00115
1*	1.5 volt, D Cell, NEDA 13F	
1*	9.0 Volt Cell, NEDA 1604	
1	1 Amp, 250V Fuse, Littelfuse # 312001 or equivalent	
1	Operator's Manual	5-116871

*Batteries are standard items replaceable from local retail stores. Refer to Table 1-1, item 9.

Table 5-2. Other Available Accessories

Description	Catalog Number
Utility Vinyl Case	00549
Leather Case	01818
Ever-Redy Leather Case	00805
5,000 Volts AC Probe	00505
5,000 Volts DC Probe	00506
10,000 Volts AC Probe	00161
10,000 Volts DC Probe	00507
30,000 Volts DC	00509
Model 150 Amp-Clamp	00532

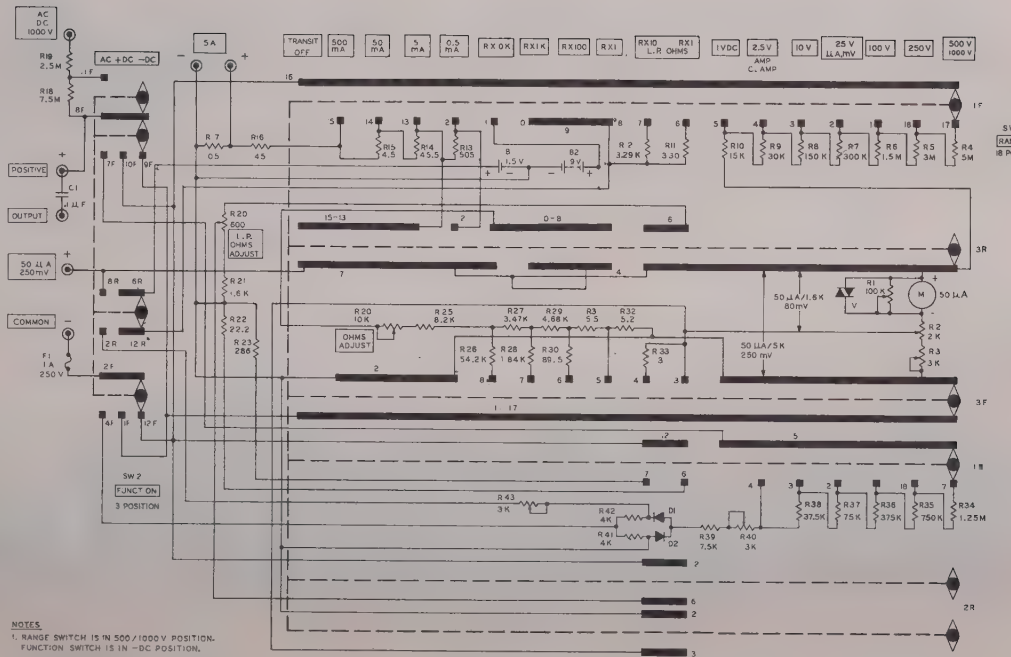
WARNING

The high voltage probes are designed to extend the useful range of the 260-6XL. Do not use the high voltage probes in circuits whose available power is high, such as power distribution transformers. These probes are intended for high impedance circuits. Read the safety instructions of this manual before using the high voltage probes (page v, and paragraphs 3.2, 3.5 and 3.6.3).

Table 5-3. Replacement Parts List

Reference Symbol	Description	Part No.
R-1	Potentiometer, 100 kΩ	5-116715
R-2	Potentiometer, 2 kΩ	5-116716
R-3	Potentiometer, 3 kΩ	5-116717
R-4	Resistor, 5 MΩ	5-110454
R-5	Resistor, 3 MΩ	5-113432
R-6	Resistor, 1.5 MΩ	5-113536
R-7	Resistor, 300 kΩ	1-113995
R-8	Resistor, 150 kΩ	1-117895
R-9	Resistor, 30 kΩ	1-115042
R-10	Resistor, 15 kΩ	1-113347
R-11	Resistor, 330 Ω	5-116720
R-12	Resistor, 3.29 kΩ	5-117112
R-13	Resistor, 505 Ω	5-116731
R-14	Resistor, 45.5 Ω (Bobbin)	10-675462
R-15	Resistor, 4.5 Ω (Bobbin)	10-675264
R-16	Resistor, 0.45 Ω (Bobbin)	10-675463
R-17	Resistor, 0.05 Ω Shunt, 5A (Calibrate in VOM)	3-812003
R-18	Resistor, 7.5 MΩ	5-111668
R-19	Resistor, 2.5 MΩ	5-111669
R-20	Potentiometer (Dual) 600 Ω Front, 10 KΩ Rear	5-116752
R-21	Resistor, 1.6 kΩ	5-116119
R-22	Resistor, 22.2 Ω (Bobbin)	10-675465
R-23	Resistor, 286 Ω	5-117111
R-24	(Not Used)	
R-25	Resistor, 8.2 kΩ	1-111030
R-26	Resistor, 54.2 kΩ	5-116725
R-27	Resistor, 3.47 kΩ	5-116753
R-28	Resistor, 1.84 kΩ	5-116723
R-29	Resistor, 4.68 kΩ	5-116718
R-30	Resistor, 89.5 Ω	5-116722

R-31	Resistor, 515 Ω	5-116732
R-32	Resistor, 5.2 Ω (Bobbin)	10-675464
R-33	Resistor, 3 Ω (Bobbin)	10-675466
R-34	Resistor, 1.25 MΩ	5-115068
R-35	Resistor, 750 kΩ	5-116726
R-36	Resistor, 375 kΩ	1-113364
R-37	Resistor, 75 kΩ	1-117258
R-38	Resistor, 37.5 kΩ	5-116719
R-39	Resistor, 7.5 kΩ	5-116678
R-40	Potentiometer, 3 kΩ	5-116714
R-41	Resistor, 4 kΩ	5-114835
R-42	Resistor, 4 kΩ	5-114835
R-43	Potentiometer, 3 kΩ	5-116714
C-1	Capacitor, 0.1 μF, 400V	1-113733
D-1	Diode, Germanium	5-115665
D-2	Diode, Germanium	5-115665
V-1	Varistor, Silicon	1-110670
F-1	Fuse, 1 Amp, 250V 3AG (1-¼" X ¼") Quick Acting	1-112507
	Function Switch, Knob	5-116761
	Ohms Adjust, Knob	5-116762
	Range Switch, Knob	5-116760
	Case Assembly, Complete (Including Handle, Less Battery Compartment Cover)	10-862883
	Battery Compartment Cover Assembly	10-560212
	Carrying Handle for Case	5-116711
	Rubber Bumper Plug	5-115039
	Front Panel Overlay	5-116869
	260-6XL Indicating Instrument with Panel Assembly	D-13804
	Cover Assembly for Indicating Instrument	10-560217
	Combination Probe Tip Leads, One Red and One Black with Removable Alligator Clips	00115
	Crocodile Clip Test Leads, One Red and One Black	07500



NOTES.

1. RANGE SWITCH IS IN 500/1000 V POSITION. FUNCTION SWITCH IS IN −DC POSITION.
2. UNLESS OTHERWISE SPECIFIED: RESISTORS IN OHMS, CAPACITORS IN µF.
3. ▭ DENOTES FRONT PANEL CONTROL OR CONNECTION POINT.

Figure 5-1. Simpson 260-6XL Schematic Diagram

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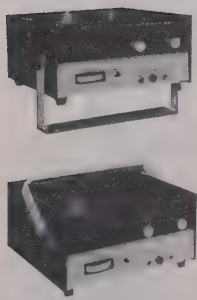

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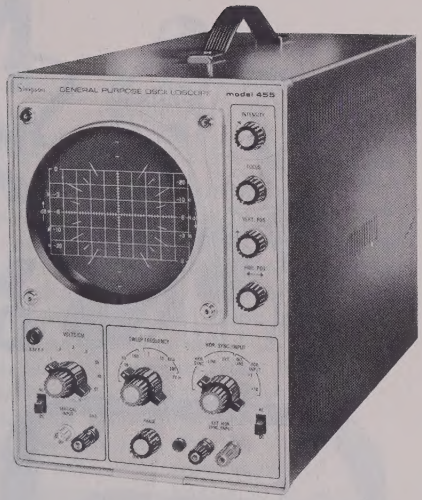

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